
4. Results

4.1 Projected Water Quality Effects

This section presents the results of the analysis of the environmental effects of the CWT discharges at both baseline and following the adoption of final limits and standards. The first subsection, **Environmental Effects of 113 CWT facilities at Baseline and with Final Limits and standards**, presents the non-scaled environmental effects of 113 of the 205 CWT facilities that EPA has identified. Specifically, EPA analyzed 12 direct and 101 indirect wastewater dischargers discharging up to 104 pollutants (see Table 4-1). The 92 CWT facilities not evaluated either are zero dischargers (42) or have insufficient data to conduct the water quality analysis.

The following subsections present analysis results for each CWT subcategory (metals, oils, and organics). Each subsection begins with a general overview and then presents results for both the direct and indirect wastewater discharges analyzed. Many facilities have operations in multiple subcategories, and therefore the sum of the number of facilities presented in the metals, oils, and organics subcategories is greater than the total (113). To prevent double counting of loadings at multiple subcategory facilities, EPA only includes wastes from metals, oils, and organic waste treatment trains in the metals, oils, and organics subcategories, respectively.

As previously explained, EPA estimates the potential benefits of controlling discharges from CWT facilities by using modeling techniques to quantify impacts on water quality in receiving water bodies (i.e., potential impacts on human health and aquatic life), and POTW operations (i.e., biological inhibition and biosolid contamination). Specifically, EPA compares under current and final requirements estimated pollutant concentrations to water quality criteria or toxic effect levels for both aquatic life and human health. EPA analyzes direct and indirect dischargers separately. The study did not evaluate the effects of the final technologies on discharging conventional pollutants (e.g., BOD, COD, TSS). For example, although under baseline conditions, CWT facilities discharge 21.5 million pounds per year of conventional pollutants, the benefits analysis focuses entirely on reductions in metals and organic pollutants. Finally, EPA assesses the effects of indirect discharges on POTW operations and biosolids contamination.

Table 4-1. The 104 Pollutants Evaluated for the CWT Industry^a

Pollutants ^{b, c}											
POLLUTANT	M E T A L S	O I L S	O R G A N I C S	POLLUTANT	M E T A L S	O I L S	O R G A N I C S	POLLUTANT	M E T A L S	O I L S	O R G A N I C S
4-Chloro-3-Methylphenol		x		Butyl Benzyl Phthalate		x		Dichloroethane, 1,2-		x	x
4-Methyl-2-Pentanone		x	x	Cadmium	x	x		Dichloroethene, 1,1-	x	x	x
Acenaphthene		x		Carbazole		x		Dichloroethene, trans 1, 2-			x
Acetophenone			x	Carbon disulfide	x	x		Diethyl ether			x
Alpha-terpineol		x		Chlorobenzene		x		Diethyl phthalate		x	
Aluminum	x	x	x	Chloroform		x	x	Dimethylformamide, N, N-	x	x	x
Anthracene		x		Chromium	x	x	x	Dimethyl phenanthrene, 3,6-		x	
Antimony	x	x	x	Chrysene		x		Dimethyl phenol, 2,4-		x	
Arsenic	x	x		Cobalt	x	x	x	Diphenyl ether		x	
Barium		x	x	Copper	x	x	x	Ethylbenzene		x	
Benzene		x	x	Cresol, o-		x	x	Fluoranthene		x	
Benzo(a)anthracene		x		Cresol, p-		x	x	Fluorene		x	
Benzofluorene, 2,3-		x		Di-n-butyl phthalate		x		Hexanoic acid		x	x
Benzoic acid	x	x	x	Dibenzofuran		x		Iron	x	x	x
Benzyl alcohol		x		Dibenzothiophene		x		Lead	x	x	
Biphenyl		x		Dibromochloromethane	x			Lithium	x		x
Bis(2-ethylhexyl) phthalate		x		Dibromoethane, 1,2-			x	Manganese	x	x	x
Boron	x	x	x	Dichloroaniline			x	Mercury	x	x	
Butanone, 2-	x		x	Dichlorobenzene, 1,4-		x		Methylene Chloride	x		x

Table 4-1. The 104 Pollutants Evaluated for the CWT Industry^a (Continued)

Pollutants ^{b, c}											
POLLUTANT	M E T A L S	O I L S	O R G A N I C S	POLLUTANT	M E T A L S	O I L S	O R G A N I C S	POLLUTANT	M E T A L S	O I L S	O R G A N I C S
Methylfluorene, 1-		x		Phenanthrene		x		Tin	x	x	x
Methylnaphthalene, 2-		x		Phenol		x	x	Titanium	x	x	
Methylphenanthrene, 1-		x		Phenylnaphthalene, 2-		x		Toluene	x	x	x
Molybdenum	x	x	x	Phosphorus	x	x	x	Trichlorobenzene, 1,2,4-		x	
N-Decane		x		Propanone, 2-	x	x	x	Trichloroethane, 1,1,1-	x	x	x
N-Docosane		x		Pyrene		x		Trichloroethane, 1,1,2-			x
N-Dodecane		x		Pyridine	x	x	x	Trichloroethene		x	x
N-Eicosane		x		Selenium	x	x		Trichlorophenol, 2,4,5-			x
N-Hexadecane		x		Silicon	x	x	x	Trichloropropane, 1,2,3-			x
N-Octadecane		x		Silver	x	x		Tripropyleneglycol methylether	x	x	
N-Tetradecane		x		Strontium	x	x	x	Vanadium	x		
Naphthalene		x		Styrene		x		Vinyl chloride			x
Nickel	x	x	x	Sulfur	x	x	x	Xylene, m-		x	x
P-Cymene		x		Tetrachloroethene		x	x	Zinc	x	x	x
Pentachlorophenol			x	Tetrachloroethane, 1,1,1,2-			x	Zirconium	x		
Pentamethylbenzene		x		Tetrachloromethane			x				

- a. EPA details the pollutants evaluated in chapter six of the technical development document. This analysis only includes a portion of the pollutants identified in Chapter 6.
- b. Pollutant counts for each CWT industry subcategory are as follows: 38 metals; 86 oils; and 50 organics.
- c. The POCs considered in this analysis are presented, by subcategory, in Appendix C.

4.1.1 Combined Environmental Effects of 113 CWT Facilities at Baseline and with Final Limits

EPA estimates that under baseline, 205 CWT facilities discharge approximately 8.6 million lbs/year of metals and organic pollutants. Under the final rule, pollutant loadings would be reduced by 50 percent or to 4.3 million lbs/year. The analysis comparing non-scaled (113 of the 205 facilities) modeled instream pollutant levels to Ambient Water Quality Criteria (AWQC) estimates that current discharge loadings will result in 252 concentrations in excess of criteria at 43 receiving water locations. As seen in Table 4-2, the final rule would reduce this number of concentrations in excess of AWQC to 156 at 38 receiving water locations. EPA estimates that CWT discharges to surface waters are responsible for approximately 0.18 cancer cases per year, but this would be reduced to 0.14 cases per year under the final rule. In addition, an estimated 101,000 persons would have reduced lead exposure and related health effects. EPA also estimates the final rule would reduce lead uptake enough to prevent the IQ loss of 60 points in angler children (i.e., children living in a recreational angler's household), and that the IQs of 0.2 fewer children would drop below 70 (see Table 4-3). EPA estimates that six of the 69 POTWs analyzed

Table 4-2. Summary of Non-Scaled Environmental Effects of 113 CWT Facilities^a

	Current	Final	Summary
Loadings (million lbs/yr) ^{b,c}	8.6	4.3	50% reduction
AWQC Excedences	252 at 43 streams	156 at 38 streams	5 streams become "CWT industry contaminant free"
Additional Cancer Cases/yr ^d	0.18	0.14	0.04 cases reduced each year
Population potentially at risk to lead exposure ^d	101,000	101,000	Annual benefits are: C Reduction of 1.5 cases of hypertension C Protection of 60 IQ points C Prevention of lowering of 0.2 children's IQs below 70
Population exposed to other non- cancer effects ^c	1,880	None	Health effects to exposed population are reduced
POTWs experiencing inhibition	6 of 69	4 of 69	Potential inhibition eliminated at 2 POTWs
Biosolid Quality			3,900 metric tons improved

a. Modeled results represent 12 direct and 101 indirect waste water dischargers.

b. 104 pollutants (see Table 4-1); Loadings are representative of metals and organic pollutants evaluated; only conventional pollutants are not included in the analysis.

c. Loadings are scaled to represent all 205 facilities. Loadings for indirects are adjusted to account for POTW removals.

d. Through consumption of contaminated fish tissue.

Table 4-3. Annual Reductions in Lead Related Health Effects From Reducing Lead Exposure of 101,000 People Potentially Affected by CWT Dischargers at 10 Reaches^a

Lead Health Effect	Men	Female	Child	Neo-Natal	Total
Hypertension (Cases)	1.5	NA	NA	NA	1.5
Coronary Heart Disease (Cases)	0.09	< 0.01	NA	NA	0.1
Cerebral Accidents (cases)	< 0.01	< 0.01	NA	NA	< 0.01
Brain Infarction (cases)	< 0.01	< 0.01	NA	NA	< 0.01
Premature Mortality (cases)	0.09	< 0.01	NA	0.01	0.1
IQ point reduction (IQ points)	NA ^b	NA	60	NA	60
Children with IQ < 70 (cases)	NA	NA	0.2	NA	0.2

a. Oil and metal dischargers are included. Organic dischargers do not have lead in waste stream.

b. Not Applicable (NA).

experience inhibition problems due to CWT wastes. Under the final rule inhibition problems would be eliminated at two POTWs. The final rule would also improve the quality of 3,900 metric tons of biosolids and allow two facilities to switch to less expensive land disposal practices.

4.1.2 Metals Subcategory

EPA estimates that 69 metal CWT facilities discharge at baseline approximately 2.56 million lbs/year of metals and organics to surface waters (see Table 4-4). Under the final rule, this pollutant loading would be reduced by 85 percent or to approximately 0.39 million lbs/year.

EPA analyzed the environmental effects of 49 of the 69 metal CWT facilities (17 facilities are zero dischargers, and three facilities had missing data). EPA estimates that the final rule would reduce lead health-related effects and prevent the IQ loss of approximately 49 points in angler children (see Table 4-5).

Table 4-4. Metals Subcategory - Summary of Pollutant Loadings

	Direct Dischargers	Indirect Dischargers ^c	Total
Current (million lbs/yr)	2.18	0.38	2.56
Final (Option 4) BPT/BAT/PSES	0.30	0.09	0.39
No. of Pollutants Evaluated	38	38	38
No. of Facilities Evaluated ^d	9	40	49

- a. Consists of 38 pollutants (see Table 4-1); Loadings are representative of metals and organic pollutants evaluated; only conventional pollutants are not included in this analysis.
- b. Loadings are scaled to represent all 69 metal facilities.
- c. For Indirect dischargers, loading estimates have been adjusted to account for POTW removals.
- d. The total universe consists of 69 facilities (9 direct, 40 indirects, 17 zero dischargers, and 3 with missing information).

Table 4-5. Metals Subcategory - Estimated Annual Reduction of Lead Related Health Effects

Lead Health Effect	Direct Dischargers (4)	Indirect Dischargers (2)	Total
Hypertension (Cases)	0.13	0.72	0.85
Coronary Heart Disease (Cases)	< 0.1	< 0.1	< 0.1
Cerebral Accidents (cases)	< 0.1	< 0.1	< 0.1
Brain Infarction	< 0.1	< 0.1	< 0.1
Premature Mortality (cases)	< 0.1	< 0.1	< 0.1
IQ Point Reduction in Children (IQ points)	11	38	49
Children with IQ < 70 (cases)	0.03	0.12	0.15

(a) Metals Subcategory - Direct Dischargers

EPA estimates that 12 direct discharging CWT facilities discharge at baseline approximately 2.18 million lbs/year of metals and organics (see Table 4-6). The final BAT/BPT (Option 4) levels would reduce this pollutant loading by 86 percent, or to 0.30 million lbs/year.

EPA analyzed the modeled environmental effects of nine of the 12 direct discharging CWT facilities. The analysis comparing modeled instream pollutant levels to AWQC estimates that 42 exceedences in eight streams would be reduced to 18 in five streams (see Table 4-6). Most of the concentrations in excess of AWQC are for chronic aquatic life criteria (see Table 4-7 and Table 4-8).

Table 4-6. Metals Subcategory - Environmental Effects of Nine Direct Dischargers^a

	Current	Final	Summary
Loadings (million lbs/yr) ^b	2.18	0.30	86% Reduction
AWQC Excedences	42 at 8 streams	18 at 5 streams	All excedences eliminated at 3 streams
Additional Cancer Cases/y ^c	< 0.1	< 0.1	Reduction of <0.1
Population of 44,000 individuals exposed to lead health effects ^c			Annual benefits are: C Reduction of 0.13 cases of hypertension C Protection of 11 IQ points C Prevention of lowering of 0.03 children's IQs below 70
Population exposed to other non-cancer effects ^c	1,040	None	Reduction of exposed population by 1,040

- a. Modeled results represent nine of twelve direct waste water dischargers. Loadings are scaled to represent all 12 facilities.
b. 38 of 104 pollutants (see Table 4-1); Loadings are representative of metals and organic pollutants evaluated; only conventional pollutants are not included in this analysis.
c. Through consumption of contaminated fish tissue.

Table 4-7. Metals Subcategory - Projected Criteria Excedences for Nine Direct Dischargers

	Acute Aquatic Life	Chronic Aquatic Life	Human Health (Organisms Only)	Human Health (Water and Organisms)	Total ^a
Current					
Streams (No.) ^b	5	8	2	4	8
Pollutants(No) ^c	5	14	1	2	15
Final Option					
Streams (No.)	3	5	1	2	5
Pollutants (No.)	2	7	1	1	8

- a. Pollutants may exceed criteria on a number of streams, therefore, total does not equal sum of pollutants exceeding criteria.
b. Number of receiving streams is nine.
c. Number of the 38 different pollutants analyzed that exceed ambient water quality and human health-based criteria.

EPA estimates cancer risk from fish consumption to be much less than 0.1 cases per year. EPA also projects that 1,040 persons are exposed to pollutants that could result in non-cancer effects under current treatment levels. However, EPA estimates that six facilities discharge lead at levels which potentially could cause adverse health effects in recreational and subsistence angler populations totaling approximately 44,000 individuals. The final discharge levels would prevent the IQ loss of 11 points in angler children.

Table 4-8. Metals Subcategory - Pollutants Projected to Exceed Criteria for Nine Direct Dischargers

Pollutants	Acute Aquatic Life ^{a, b}		Chronic Aquatic Life ^{a, b}		Human Health ^{a, b} (water and organisms)		Human Health ^{a, b} (organisms only)	
	Current	Final Option	Current	Final Option	Current	Final Option	Current	Final Option
Arsenic	—	—	—	—	4(0-0.84) ^c	2(0-0.48)	2(0-0.84) ^c	1(0.48)
Aluminum	—	—	1(93.7)	—	—	—	—	—
Boron	—	—	2(4.5-81)	1(28.5)	—	—	—	—
Cadmium	2(4-23)	—	2(4-23)	—	1(23)	—	—	—
Chromium	—	—	2(23-65)	—	—	—	—	—
Copper	1(38)	—	1(38)	—	—	—	—	—
Lead	—	—	2(1-2.4)	1(0.58)	—	—	—	—
Molybdenum	—	—	1(10.4)	1(5.9)	—	—	—	—
Nickel	—	—	1(8.1)	—	—	—	—	—
Phosphorus	5(4.2-3911)	3(0.6-84)	8(0.1-3911)	5(0.6-84)	—	—	—	—
Selenium	1(2.0)	1(1.8)	1(2.0)	1(1.8)	—	—	—	—
Silver	—	—	1(0.3)	1(0.09)	—	—	—	—
Tin	—	—	1(24.8)	—	—	—	—	—
Zinc	1(27.8)	—	1(27.8)	—	—	—	—	—
Zirconium	—	—	1(4.5)	1(4.4)	—	—	—	—
Total Pollutants	5	2	14	7	2	1	1	1

a. Number(s) in parentheses represent instream concentration (µg/L).

b. Numbers outside of parentheses represent the number of occurrence(s) of a pollutant; however different pollutants may be discharged from the same water body so the total number of occurrences is not the sum of the water bodies where exceedences occur.

c. Arsenic at 0.84µg/L is estimated to exceed human health criteria for both organisms only ($HH_{oo(As)} = 0.16 \mu\text{g/L}$) and water and organisms ($HH_{wo(As)} = 0.02 \mu\text{g/L}$)

(b) Metals Subcategory - Indirect Dischargers

EPA estimates that 42 indirect discharging CWT facilities currently discharge 0.38 million lbs/year of metals and organics (see Table 4-9). The final PSES (Option 4) treatment level would reduce pollutant loadings by 77 percent, or to 0.09 million lbs/year.

EPA modeled the environmental effects of 40 of the 42 indirect discharging CWT facilities. The analysis comparing modeled instream pollutant levels to AWQC estimates that 82 exceedences in 19 streams would be reduced to 50 exceedences in 16 streams (see Table 4-9). Most of the concentrations in excess of AWQC are for chronic aquatic life criteria (see Table 4-10 and Table 4-11).

Table 4-9. Metals Subcategory - Environmental Effects of 40 Indirect Dischargers^{a, b}

	Current	Final	Summary
Loadings (million lbs/yr) ^c	0.38	0.09	77% Reduction
AWQC Excedences	82 at 19 streams	50 at 16 streams	3 streams became “contaminant-free”
Additional Cancer Cases/yr ^d	< 0.1	< 0.1	Reduction of <0.1
Population of 21,000 individuals exposed to lead health effects ^d			Annual benefits are: C Reduction of 0.72 cases of hypertension C Protection of 38 IQ points C Prevention of lowering of 0.12 children’s IQs below 70
Population exposed to other non-cancer effects ^d	840	None	Affected population reduced by 840
POTWs experiencing inhibition ^e	2 POTWs with three pollutants	1 POTW with one pollutant	Potential inhibition reduced at one POTW
Biosolid Quality	1 POTW	0 POTWs	1 POTW able to switch from incineration to surface disposal

- a. Modeled results represent 40 of 42 indirect waste water dischargers. Loadings are scaled to represent all 42 indirects
- b. For indirect dischargers, loading estimates have been adjusted to account for POTW removals.
- c. 38 of 104 pollutants (see Table 4-1); Loadings are representative of metals and organic pollutants evaluated; conventional pollutants such as Chemical Oxygen Demand (COD), BOD₅ and Total Suspended Solids (TSS); Total Phenols, hexanoic acid and Hexane Extractable Material are not representative of the loadings.
- d. Through consumption of contaminated fish tissue.
- e. Total number of POTWs receiving discharges from Metal subcategory CWTs is 41.

Table 4-10. Metals Subcategory - Projected Criteria Excedences for 40 Indirect Dischargers

	Acute Aquatic Life	Chronic Aquatic Life	Human Health (Water and Organisms)	Human Health (Organisms Only)	Total ^a
Current					
Streams (No.) ^b	12	19	8	1	19
Pollutants (No.) ^c	9	14	4	1	19
Final Option					
Streams (No.)	10	16	7	1	16
Pollutants (No.)	3	9	1	1	10

- a. Pollutants may exceed criteria on a number of streams, therefore, the total does not equal the sum of pollutants exceeding criteria.
- b. Number of receiving streams is 33 (19 rivers and 14 estuaries).
- c. Number of different pollutants that exceed ambient water quality and human health based criteria.

EPA estimates cancer risk from fish consumption to be much less than 0.1 cases per year. However, EPA estimates that two facilities discharge lead at levels which potentially could cause adverse health effects in

recreational and subsistence angler populations totaling approximately 21,000 individuals (see Table 4-9). The final discharge levels would prevent the IQ loss of 38 points in angler children. EPA also estimates a decreased risk of non-cancer effects to an additional 840 anglers.

Table 4-11. Metals Subcategory - Pollutants Projected to Exceed Criteria for 40 Indirect Dischargers

Pollutants	Acute Aquatic Life ^{a, b}		Chronic Aquatic Life ^{a, b}		Human Health ^{a, b} (water and orgs.)		Human Health ^{a, b} (orgs. only)	
	Current	Final Option	Current	Final Option	Current	Final Option	Current	Final Option
Aluminum	—	—	1(47.7)	—	—	—	—	—
Antimony	—	—	—	—	1(26.9)	—	—	—
Arsenic ^c	—	—	—	—	8(0-1)	7(0-1)	1(1.2)	1(0.95)
Boron	—	—	10(7.3-522)	2(4.4-125)	—	—	—	—
Cadmium	2(0.5-0.5)	—	2(0.5-0.5)	—	—	—	—	—
Chromium	1(2.6)	—	2(2.6-15.3)	—	—	—	—	—
Cobalt	—	—	—	—	—	—	—	—
Copper	2(0.1-5.5)	2(0.1-2.3)	1(5.54)	1(2.3)	—	—	—	—
dibromo-chloromethane	—	—	—	—	1(0.4)	—	—	—
dichloro-ethene, 1, 1-	—	—	—	—	1(0.8)	—	—	—
Lead	1(8.4)	—	1(8.4)	1(0.8)	—	—	—	—
Lithium	—	—	1(516.7)	—	—	—	—	—
Molybdenum	—	—	2(1.7-92.3)	2(1-27.6)	—	—	—	—
Nickel	1(190.4)	—	1(190.4)	1(10.6)	—	—	—	—
Phosphorus	12(0.8-297)	10(2-148)	19(0.03-297)	16(0.1-148)	—	—	—	—
Selenium	2(0.3-3.6)	2(0.2-3.6)	2(0.3-3.6)	2(0.2-3.6)	—	—	—	—
Silver	1(0.51)	—	1(0.51)	1(0.06)	—	—	—	—
Tin	—	—	1(26.9)	—	—	—	—	—
Zinc	2(0.3-9.9)	—	—	—	—	—	—	—
Zirconium	—	—	2(0.4-16.3)	2(0.4-11.3)	—	—	—	—
Total Pollutants	9	3	14	9	4	1	1	1

a. Number(s) in parentheses represent instream concentrations (µg/L).

b. Numbers outside of parentheses represent the number of occurrence(s) of a pollutant, however different pollutants may be discharged from the same water body. Therefore the total number of occurrences are not the sum of the waterbodies where exceedences occur.

EPA estimates that two of the 39 POTWs (39 of 41 POTWs analyzed) receiving CWT waste waters experience inhibition problems due to three pollutants in CWT wastes (see Table 4-12). The final rule would decrease the number of adversely affected facilities to one. The final rule would also allow one POTW to switch its biosolids disposal from incineration to surface disposal.

Table 4-12. Metals Subcategory - Projected POTW Inhibition Problems from 40 Indirect Dischargers

	Biological Inhibition
Current	
POTWs (No.) ^a	2
Pollutants (No.) ^b	3 ^c
Total Problems	2
Final Option	
POTWs (No.)	1
Pollutants (No.)	1 ^d
Total Problems	1

a. 42 CWT facilities discharge to 41 POTWs

b. 23 of 104 pollutants are analyzed

c. chromium, boron, nickel

d. boron

4.13. Oils Subcategory

EPA estimates that 125 oil CWT facilities discharge at baseline approximately 1.83 million lbs/year of metals and organics to surface waters (see Table 4-13). Under the final rule, pollutant loadings would be reduced by 42 percent or to 1.05 million lbs/year.

Table 4-13. Oils Subcategory - Summary of Pollutant Loadings

Loadings (million pounds/year) ^{a, b}			
	Direct Dischargers	Indirect Dischargers ^b	Total
Current	0.03	1.80	1.83
Final (BPT/BAT- Option 9) (PSES - Option 8)	0.02 ---	--- 1.03	1.05
No. of Pollutants Evaluated	86	86	86
No. of Facilities Evaluated ^c	3	72	75

a. Consists of 86 pollutants (see Table 4-1); Loadings are representative of metals and organic pollutants evaluated; only conventional pollutants are not included in this analysis.

b. Loadings are scaled to represent all 125 oil facilities.

c. For indirect dischargers, loading estimates have been adjusted to account for POTW removals.

d. The total universe consists of 125 facilities (3 direct, 72 indirects, 10 with missing information, and 40 zero dischargers).

EPA analyzed the environmental effects of 75 of the 125 oil CWT facilities (3 direct, 72 indirects, 10 with missing information, and 40 zero dischargers). EPA estimates that the final limits would reduce additional annual cancer cases from approximately 0.07 under baseline conditions to 0.06. EPA also estimates the final rule would reduce lead health related effects and prevent the IQ loss of approximately 11 points in angler children, and the IQs of 4 children from dropping below 70 (see Table 4-14).

Table 4-14. Oils Subcategory - Estimated Annual Reduction of Lead Related Health Effects

Lead Health Effect	Total	Direct (2)	Indirect Dischargers (3)
Hypertension (Cases)	0.62	0.20	0.42
Coronary Heart Disease (Cases)	<0.1	<0.1	< 0.1
Cerebral Accidents (cases)	<0.1	<0.1	< 0.1
Brain Infarction	<0.1	<0.1	< 0.1
Premature Mortality (cases)	<0.1	<0.1	< 0.1
IQ Point Reduction in Children (IQ points)	11	11	0
Children with IQ < 70 (cases)	0.03	0.03	0

(a) Oils Subcategory - Direct Dischargers

EPA estimates that under baseline conditions three direct discharging CWT oils subcategory facilities discharge approximately 30,900 lbs/year of metals and organics (see Table 4-15). Under the final BAT/BPT (Option 9) levels, pollutant loadings would be reduced by 31 percent, or to 21,400 lbs/year.

EPA modeled the environmental effects of the three direct discharging oil CWT facilities. The analysis comparing modeled instream pollutant levels to AWQC estimates that 36 concentrations in excess of AWQC in two streams would be reduced to 28 exceedences in two streams (see Tables 4-15, 4-16, and 4-17). None of the facilities discharge at levels that could cause adverse health effects from noncarcinogens.

Table 4-15. Oils Subcategory - Environmental Effects of 3 Direct Discharging CWT Facilities

	Current	Final	Summary
Loadings (lbs/yr) ^{ab}	30,900	21400	31% Reduction
AWQC Excedences	36 at 2	28 at 2	22% Reduction
Additional Cancer Cases/yr ^c	< 0.1	< 0.1	Reduction of <0.1
Population exposed to non-cancer effects ^c	None	None	

a. Modeled results represent three direct waste water dischargers.

b. 86 of 104 pollutants (see Table 4-1); Loadings are representative of metals and organic pollutants only.

c. Through consumption of contaminated fish tissue.

Table 4-16. Oils Subcategory - Projected Criteria Excedences for 3 Direct Dischargers

	Acute Aquatic Life	Chronic Aquatic Life	Human Health (Water and Orgs.)	Human Health (Orgs. Only)	Total ^a
Current					
Streams (No.)	2	2	2	2	2
Pollutants (No.) ^b	7	15	3	3	16
Final Options (9)					
Streams (No.)	2	2	2	2	2
Pollutants (No.)	5	13	2	2	14

a. Pollutants may exceed criteria on a number of streams, therefore the total does not equal the sum of pollutants exceeding criteria.

b. 86 pollutants of 104 (see Table 4-1).

EPA estimates cancer risk from fish consumption to be much less than 0.1 cases per year. EPA also estimates that the final limits would reduce lead health related effects and prevent the IQ loss of approximately 11 points in angler children.

Table 4-17. Oils Subcategory - Pollutants Projected to Exceed Criteria for 3 Direct Dischargers^{a, b}

Pollutants	Acute Aquatic Life		Chronic Aquatic Life		Human Health (Water and Orgs.)		Human Health (Orgs. Only)	
	Current	Final Option	Current	Final Option	Current	Final Option	Current	Final Option
anthracene	1(0.1)	1(0.1)	1(0.1)	1(0.1)	—	—	—	—
benzo (a) anthracene	—	—	1(0.1)	1(0.1)	2(0.02-0.1)	2(0.02-0.1)	2(0.02-0.1)	2(0.02-0.1)
arsenic	—	—	—	—	2(0.07-0.3)	2(0.07-0.3)	1(0.3)	1(0.3)
aluminum	1(186)	1(62)	2(41-186)	1(62)	—	—	—	—
boron	—	—	2(101-461)	2(80-363)	—	—	—	—
cadmium	—	—	1(0.1)	—	—	—	—	—
carbon disulfide	—	—	1(0.1)	1(0.1)	—	—	—	—
cobalt	—	—	1(7.8)	1(7.8)	—	—	—	—
copper	1(3.2)	1(0.5)	1(3.2)	1(0.5)	—	—	—	—
iron	—	—	1(212)	1(103)	—	—	—	—
lead	1(3.7)	—	2(0.8-3.7)	1(0.4)	—	—	—	—
mercury	1(0.1)	—	1(0.1)	—	1(0.1)	—	1(0.1)	—
molybdenum	—	—	1(17.4)	1(6.8)	—	—	—	—
nickel	—	—	1(4.4)	1(4.4)	—	—	—	—
phosphorus	2(19-86)	2(19-86)	2(19-86)	2(19-86)	—	—	—	—
zinc	1(54)	1(9)	1(54)	1(9)	—	—	—	—
Total Pollutants	7	5	15	13	3	2	3	2

a. Number(s) in parentheses represent instream concentrations (µg/L).

b. Numbers outside of parentheses represent the number of occurrence(s) of a pollutant, however different pollutants may be discharged from the same water body. Therefore the total number of occurrences are not the sum of the waterbodies where exceedences occur.

(b) Oils Subcategory - Indirect Dischargers

EPA estimates that 86 indirect discharging CWT facilities currently discharge 1.80 million lbs/year of metals and organics (see Table 4-18). Under the final PSES (Option 8) treatment level, pollutant loadings would be reduced by 43 percent or to 1.03 million lbs/year.

EPA modeled the environmental effects of 72 of the 86 indirect discharging oil CWT facilities. The analysis comparing modeled instream pollutant levels to AWQC estimates that 66 concentrations in excess of AWQC in 19 streams would be reduced to 50 exceedences in 19 streams (see Tables 4-18, 4-19, and 4-20).

Table 4-18. Oils Subcategory - Environmental Effects of 72 Indirect Dischargers^a

	Current	Final	Summary
Loadings (million lbs/yr) ^b	1.80	1.03	43% Reduction
AWQC Exceedences	66 at 19 streams	50 at 19 streams	24% Reduction
Additional Cancer Cases/yr ^c	<0.1	<0.1	Reduction of <0.1
Population of 42,000 individuals exposed to lead health effects ^c		Health effects are reduced	Annual benefits are: C Reduction of 0.42 cases of hypertension C Protection of 0 IQ points C Prevention of lowering of 0 children's IQs below 70
Population of individuals exposed to other non-cancer effects ^c	None	None	None
POTWs experiencing inhibition ^d	5 POTWs with one pollutant. Potential inhibition reduced by one POTW	3 POTWs with one pollutant	Potential inhibition reduced by 2 POTWs
Biosolid Quality	1 POTW	0 POTWs	1 POTW able to switch from incineration to surface disposal

a. Modeled non-scaled results represent 72 indirect waste water dischargers.

b. 86 of 104 pollutants (see Table 4-1); Loadings are representative of metals and organic pollutants evaluated; conventional pollutants such as Chemical Oxygen Demand (COD), BOD₅ and Total Suspended Solids (TSS); Total Phenols, hexanoic acid and Hexane Extractable Material are not representative of the loadings. Loadings are scaled to represent all 86 facilities. Loadings are adjusted for POTW removals.

c. Through consumption of contaminated fish tissue.

d. Total number of POTWs receiving discharges from Oil subcategory CWTs is 56.

Table 4-19. Oils Subcategory - Projected Criteria Excedences for 72 Indirect Dischargers

	Acute Aquatic Life	Chronic Aquatic Life	Human Health (Water and Orgs.)	Human Health (Orgs. Only)	Total ^a
Current					
Streams (No.) ^b	10	19	5	4	19
Pollutants (No.) ^c	4	9	3	3	13
Final Options (8)					
Streams (No.)	10	19	4	3	19
Pollutants (No.)	2	5	2	2	8

a. Pollutants may exceed criteria on a number of streams, therefore the total does not equal the sum of pollutants exceeding criteria.

b. 56 POTWs discharge into 56 waterbodies (32 rivers and 24 estuaries).

c. 86 pollutants of 104 (see Table 4-1).

EPA estimates that under the final rule, annual cancer cases from consumption of contaminated fish from water bodies receiving oils indirect dischargers would be less than 0.1 cases per year. EPA estimates that under the final rules, there would be no effect on the IQ of the children of anglers, although there would be a small reduction in adult cases of hypertension.

EPA estimates that five of the 54 POTWs analyzed experience inhibition problems due to one pollutant in CWT wastes (see Table 4-21). The final rule would decrease the number of affected POTWs to three. The final rule would also allow one POTW to switch its biosolids disposal from incineration to surface disposal.

Table 4-20. Oils Subcategory - Pollutants Projected to Exceed Criteria for 72 Indirect Dischargers^{a, b}

Pollutants	Acute Aquatic Life		Chronic Aquatic Life		Human Health (Water and Orgs.)		Human Health (Orgs. Only)	
	Current	Final Option	Current	Final Option	Current	Final Option	Current	Final Option
benzo (a) anthracene	—	—	—	—	4(0.003-0.007)	3(0.003-0.005)	4(0.003-0.007)	3(0.003-0.005)
bis(2-ethylhexyl phthalate	—	—	—	—	2(5.2-8.5)	—	1(8.5)	—
arsenic	—	—	—	—	5(0.02-0.2)	4(0.02-0.2)	1(0.2)	1(0.2)
aluminum	1(3.6)	—	1(3.6)	1(2.0)	—	—	—	—
boron	—	—	7(2.5-179)	6(5.1-120)	—	—	—	—
lead	—	—	3(0.2-0.6)	—	—	—	—	—
molybdenum	—	—	2(3.1-7.2)	1(2.1)	—	—	—	—
zinc	1(2.5)	1(1.1)	1(2.5)	—	—	—	—	—
copper	1(0.1)	—	—	—	—	—	—	—
phosphorus	10(0.2-13.4)	10(0.2-13.4)	19(0.02-13.4)	19(0.02-13.4)	—	—	—	—
carbon disulfide	—	—	1(0.044)	—	—	—	—	—
cobalt	—	—	1(1.6)	1(1.6)	—	—	—	—
N-hexadecane	—	—	1(25)	—	—	—	—	—
Total Pollutants	4	2	9	5	3	2	3	2

a. Number(s) in parentheses represent instream concentrations (µg/L).

b. Numbers outside of parentheses represent the number of occurrence(s) of a pollutant, however different pollutants may be discharged from the same water body. Therefore the total number of occurrences are not the sum of the waterbodies where exceedences occur.

Table 4-21. Oils Subcategory - Projected POTW Inhibition Problems from 72 Indirect Dischargers

	Biological Inhibition
Current	
POTWs (No.) ^b	5
Pollutants (No.) ^c	1 ^a
Total Problems	4
Final Option 9	
POTWs (No.)	3
Pollutants (No.)	1
Total Problems	3

a. boron

b. 56 POTWs discharge into 56 waterbodies (32 rivers and 24 estuaries).

c. 86 pollutants of 104 (see Table 4-1).

4.1.4 Organics Subcategory

EPA estimates that 43 organic CWT facilities discharge at baseline approximately 4.18 million lbs/year of metals and organics to surface waters (see Table 4-22). Under the final rule, pollutant loadings would be reduced by 33 percent or to 2.82 million lbs/year. EPA analyzed the environmental effects of 19 of 43 (24 zero dischargers) organic subcategory CWT facilities.

Table 4-22. Organics Subcategory - Pollutant Loadings for 19 Dischargers

Loadings (millions pounds/year) ^{a, b}			
	Direct Dischargers	Indirect Dischargers	Total
Current	0.95	3.23	4.18
Final (Option 4) BPT/BAT/PSES	0.95	1.87	2.82
No. of Pollutants Evaluated	49	49	49
No. of Facilities Evaluated ^b	4	15	19

a. Consists of 49 pollutants (see Table 4-1); Loadings are representative of metals and organic pollutants evaluated; only conventional pollutants are not included in this analysis. Loadings are scaled to represent 43 facilities.

b. The total universe consists of 43 facilities (24 are zero dischargers).

(a) Organics Subcategory - Direct Dischargers

EPA estimates that under baseline conditions four direct discharging CWT facilities discharge approximately 0.95 million lbs/year of metals and organics facilities (see Table 4-23). Under the final BAT/BPT (Option 4) levels, pollutant loadings would remain at about 0.95 million lbs/year.

Table 4-23. Organics Subcategory - Environmental Effects of Four Direct Dischargers^a

	Current	Final	Summary
Loadings (million lbs/yr) ^b	0.95	0.95	No Reduction
AWQC Excedences	two at one stream	two at one stream	No Reduction
Additional Cancer Cases/yr ^c	< 0.1	< 0.1	Reduction of <0.1
Population exposed to non-cancer effects ^c	None	None	No Reduction

a. Modeled results and loadings represent all of the four direct waste water dischargers.

b. 49 of 104 pollutants (see Table 4-1); Loadings are representative of metals and organic pollutants evaluated; only conventional pollutants are not included in this analysis.

c. Through consumption of contaminated fish tissue.

EPA modeled the environmental effects of four organic direct discharging CWTs. The analysis comparing modeled instream pollutant levels to AWQC estimates that two excedences in one stream would still occur under the final rule. EPA estimates cancer risk from fish consumption to be much less than 0.1 cases per year. EPA also projects that no human populations are exposed to pollutants that could result in non-cancer effects under current or final treatment levels.

(b) Organics Subcategory - Indirect Dischargers

EPA estimates that 15 indirect discharging CWT facilities currently discharge 3.23 million lbs/year of metals and organics (see Table 4-24). Under the final PSES (Option 4) treatment level, pollutant loadings would be reduced by 42 percent, or to 1.87 million lbs/year.

EPA modeled the environmental effects of 15 organic indirect discharging CWT facilities. The analysis comparing modeled instream pollutant levels to AWQC estimates that 46 concentrations in excess of AWQC in 11 streams would be reduced to 29 concentrations in excess of AWQC in eight streams (see Tables 4-24, 4-25, and 4-26).

EPA estimates cancer risk from fish consumption would be reduced from approximately 0.09 cases per year to 0.08 cases per year. EPA also estimates that organic indirect discharges do not substantially increase risk of non-cancer effects to local anglers. No POTWs are estimated to be affected by CWT organic discharges.

Table 4-24. Organics Subcategory - Environmental Effects of 15 Indirect Dischargers^{a, b}

	Current	Final	Summary
Loadings (million lbs/yr) ^c	3.23	1.87	42% Reduction
AWQC Excedences	46 at 11 streams	29 at 8 streams	3 streams become “CWT contaminant-free”
Additional Cancer Cases/yr ^d	0.09	0.08	Reduction of 0.01
Population exposed to non-cancer effects ^d	None	None	No Reduction
POTWs experiencing inhibition ^c	None	None	No Reduction
Biosolid Quality	None	None	No Reduction

a. Modeled results represent 15 indirect waste water dischargers (five facilities are zero dischargers).

b. For indirect dischargers, loading estimates have been adjusted to account for POTW removals.

c. Consists of 49 pollutants (see Table 4-1); Loadings are representative of metals and organic pollutants evaluated; only conventional pollutants are not included in this analysis.

d. Through consumption of contaminated fish tissue.

e. Total number of POTWs receiving discharges from organic subcategory CWTs is 15.

Table 4-25. Organics Subcategory - Projected Criteria Excedences for 15 Indirect Dischargers

	Acute Aquatic Life	Chronic Aquatic Life	Human Health (Water and Orgs.)	Human Health (Orgs. Only)	Total ^a
Current					
Streams (No.)	3	5	11	5	11
Pollutants (No.) ^b	2	3	5	1	7
Final Option					
Streams (No.)	2	3	8	3	8
Pollutants (No.)	2	3	5	1	7

a. Pollutants may exceed criteria on a number of streams, therefore, the total does not equal the sum of pollutants exceeding criteria.

b. Number of different pollutants that exceed ambient water quality and human health based criteria.

Table 4-26. Organics Subcategory - Pollutants Projected to Exceed Criteria for Indirect Discharger

Pollutants	Acute Aquatic Life ^{a, b}		Chronic Aquatic Life ^{a, b}		Human Health (Water and Orgs.) ^{a, b}		Human Health (Orgs. Only) ^{a, b}	
	Current	Final Option	Current	Final Option	Current	Final Option	Current	Final Option
Boron	—	—	2(9.3-14.3)	1(9.3)	—	—	—	—
Methylene chloride	—	—	—	—	5(34.4-350)	3(34.4-284)	—	—
Vinyl chloride	—	—	—	—	5(0.03-0.3)	3(0.03-0.2)	—	—
Tetrachloro-methane	—	—	—	—	2(0.5-0.7)	1(0.5)	—	—
Phosphorus	3(0.3-0.8)	2(0.3-0.5)	5(0.1-0.8)	3(0.1-0.5)	—	—	—	—
Pentachloro-phenol	2(2.2-2.7)	1(2.2)	2(2.2-2.7)	1(2.2)	4(0.43-2.7)	3(0.3-2.2)	—	—
Dibromo-ethane, 1, 2-	—	—	—	—	11(0-1.1)	8(0-0.9)	5(0.1-1)	3(0.1-1)
Total Pollutants	2	2	3	3	5	5	1	1

a. Number(s) in parentheses represent instream concentrations (µg/l).

b. Numbers outside of parentheses represent the number of occurrence(s) of a pollutant, however different pollutants may be discharged from the same water body. Therefore the total number of occurrences are not the sum of the water bodies where exceedences occur.

4.2 Documented Environmental Effects

4.2.1 Permit Violations of CWT Facilities

EPA Regional personnel and the corresponding State Pretreatment Coordinators identified a total of 35 facilities which have had various permit violations (see Appendix D, Table D-1). Of the 35 facilities that have reported violations, only five continue to have discharge violations or continue to present problems for the receiving POTW. Violations may take the form of exceeding permit limits or other, local limit pass through problem for receiving POTW, negative effect on surface water quality, or negative effect on water odor. The most commonly cited violations involve metal discharges.

4.2.2 Effects of CWT Wastes on POTW Operations and Water Quality

EPA identified environmental effects on POTW operations and water quality due to discharges of pollutants from nine indirect CWT facilities. Effects include seven cases of impairment to POTW operations due to cyanide, nitrate/nitrite, sodium, zinc and ammonia, and one case of an effect on the quality of receiving water due to organics (Table 4-27). In addition, the states identified four direct centralized waste treatment facilities and eight POTWs, which receive the discharge from 13 facilities, as point sources causing water quality problems included on state 304(1) Short Lists (see Tables 4-28 and 4-29).

Pollutants of concern include cadmium, copper, cyanide, lead, mercury, nickel, selenium, silver, zinc, and organics. Section 304(1) of the Water Quality Act of 1987 requires States to identify water bodies impaired by the presence of toxic substances, to identify point source discharges of these toxics, and to develop Individual Control Strategies (ICSs) for these discharges. The Short List is a list of waters for which a State does not expect achievement of the applicable water quality standards (numeric or narrative) to be achieved after technology-based requirements have been met due entirely or substantially to point source discharges of Section 307(a) toxics.

Table 4-27. Documented Environmental Effects of CWT Wastes on POTW Operations and Water Quality

POTW	Identified Impacts
Case #1	High concentrations of nitrate, nitrate and sodium in CWT's batch discharges responsible for interference of POTW operations (1993/1994). High chlorine demand of discharges caused loss of chlorine residual and resulted in POTW fecal coliform violations; \$5000 fine is pending.
Case #2	Permit violations for phosphorus and total cyanide (1992/1993). Discharge of high levels of cyanide caused interference of POTW operations and results in \$10,000 fine.
Case #3	Municipality below POTW developed drinking water taste and odor problems. Organics discharged by CWT identified as source.
Case #4	Permit violations of Total Toxic Organics(TTO), cyanide, nickel, fats, oils and grease (FOG), lead, zinc and mercury (1989-1990). Resulted in \$60,000 fine.
Case #5	Zinc and Ammonia pass-through events from CWT discharges caused POTW NPDES violations in 1991 and 1996, respectively.
Case #6	Ammonia-nitrate pass-through from CWT discharge caused POTW NPDES violations due to nitrification inhibition (1991/1992). POTW fined CWT facility \$3,450 for violation.
Case #7	Zinc pass-through from CWT discharge caused POTW NPDES violations on 3 occasions (1993). Since CWT receives both wastewater and hazardous wastes, under CFR section 261.4, they claim they do not need a RCRA permit. In 1997 a law suit between the CWT and both the POTW and Citizens was settled. The CWT paid \$650,000 and \$300,000 to the POTW and citizens, respectively.
Case #8	High strength ammonia discharge from CWT caused inhibitions problems resulting in low pH POTW NPDES violations on 3 occasions (1991).
Case #9	POTW permit violations of copper and cyanide resulted in a pass-through event. CWT fined cost of all analytic and administrative work needed to be performed subsequent to the violations. This order expired in 1998, and now the POTW is collecting new compliance data.

Source: EPA Regions and State Pretreatment Coordinators.

Table 4-28. CWT Facilities Included on State 304(L) Short Lists

NPDES	Facility Name	City	Waterbody	Reach Number	Listed Pollutants
AL0003247	Sloss Industries	Birmingham	Five Mile Creek	03160111006	Cadmium, Copper, Cyanide, Lead, Zinc
CT0001376	Pratt & Whitney	East Hartford	Willow Brook (Connecticut River)	01080205024	Copper, Nickel, Zinc
NJ0003867	CP Chemicals	Sewaren	Woodbridge Creek (Arthur Kill)	02030104003	Copper, Lead, Nickel, Zinc
PA0027715	Mill Service	Yukon	Sewickley Creek	05020006045	Copper, Lead, Silver

Source: Compiled from OW files dated April/May 1991.

Table 4-29. POTWs Which Receive Discharge From CWT Facilities and are Included on State 304(L) Short Lists

Facility Name	City	Receiving POTW	POTW NPDES	Waterbody	Reach Number	Pollutants
Clean Harbors	Baltimore	Back River WWTP	MD0021555	Back River to Curtis Bay	18050004002	Lead, Mercury, Selenium
Environmental Waste Control	Inkster	Detroit WWTP	MI0022802	Detroit River	04090004009	Cadmium, Copper, Lead, Mercury, PCBs
Edwards Oil	Detroit	Detroit WWTP	MI0022802	Detroit River	04090004009	Cadmium, Copper, Lead, Mercury, PCBs
DYNECOL	Detroit	Detroit WWTP	MI0022802	Detroit River	04090004009	Cadmium, Copper, Lead, Mercury, PCBs
American Tank Service	Ferndale	Detroit WWTP	MI0022802	Detroit River	04090004009	Cadmium, Copper, Lead, Mercury, PCBs
American Waste Oil	Belleville	Detroit WWTP	MI0022802	Detroit River	04090004009	Cadmium, Copper, Lead, Mercury, PCBs
CYANOKEM	Detroit	Detroit WWTP	MI0022802	Detroit River	04090004009	Cadmium, Copper, Lead, Mercury, PCBs
Chemical Waste Management	Newark	Passaic Valley Sewage Comm.	NJ0021016	Upper New York Bay	02030104001	Cadmium, Lead, Mercury
Waste Conversion	Hatfield	Hatfield TWP Mun. Authority	PA0026247	W.B. Neshaminy Creek to Neshaminy River	02040201011	27 Organics
Envirite	York	Springettsbury TWP	PA0026808	Codorus Creek	02050306066	–
ETICAM	Warwick	Warwick WWTP	RI0100234	Pawtuxet River	0109004029	Lead, Silver
Belpar Environmental	Prince George	Hopewell POTW	VA0066630	Gravelly Run to James River	02080206041	Copper, Lead, Zinc
Crosby and Overton	Kent	Metro (Renton STP)	WA0029581	Green River	17110013004	–

Source: Compiled From OW Files Dated April/May 1991.